

This completes the subfamilies and recognizable genera of Slugs. I have in this paper preferred to give the facts almost without any discussion of the problems illustrated by them, partly because such a discussion would be more suitable in connexion with a paper of less limited scope, and partly because it would render the present contribution unduly long.

2. On a Viviparous Bathybial Fish from the Bay of Bengal.

By A. ALCOCK, M.B., Surgeon I.M.S. (Communicated by Prof. J. WOOD-MASON, F.Z.S.)

[Received March 16, 1891.]

In the 'Annals and Magazine of Natural History' for November 1889 (vol. iv. ser. 6, pp. 389-390), I described under the name of *Saccogaster maculata* a new type of Brotuline Ophidiids allied to *Catalax*. The two specimens upon which the genus was established were described as females $3\frac{3}{8}$ and 4 inches long, with gravid ovaries; they were taken in 193 fathoms off the mouths of the Gangetic Delta.

Among the characters which distinguish *Saccogaster* the two most marked are its sac-like abdomen and its loose imperfectly-scaled skin.

On the 24th December last, in a very successful haul of the trawl in 240 fathoms off the mouths of the Kistna Delta, another specimen of *Saccogaster maculata* was obtained. It proved to be an adult male, $3\frac{1}{2}$ inches long, with ripe milt. Though otherwise resembling the female in external characters, it differs in having a deep post-anal depression or excavation, which is filled by a large bilobed papilla with the genital pore opening into the groove between the lobes. The papilla is thick, fleshy, and smooth; each lobe is about 2 mm. long and 1.25 mm. broad, and is pigmented at the apex.

In consequence of the discovery of this genital papilla a microscopic examination of a portion of one of the ovaries of the original type specimen was made, and it was found that in the ova as they lie *in situ* the development of the embryo is already far advanced.

Unfortunately the material is not in the best state of preservation, but the ova are still in a sufficiently good condition to show the general relations of the embryo.

The embryos are vermiform; they are about 1.5 mm. in length, and are closely applied to the yolk-sac, which they embrace through rather more than three-quarters of its circumference; the cerebral lobes, optic vesicles, and long free tail-fold are plainly apparent, but beyond these and the continuous bright line of the notochord nothing can now be made out; the yolk-sac is a little more than

half a millimetre in the major diameter and a little less in the other diameters.

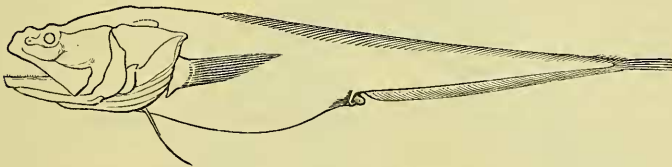
The fact of the viviparity of *Saccogaster maculata* being thus established, we may infer that the genital papilla of the male is an organ for effecting the internal impregnation of the ova.

In the female no copulatory modification of the oviduct can be made out; but the circumference of the genital pore is thickened and spongy.

In the males of two other Brotuline Ophidiids (namely, *Dinematichthys iluocæteoides* and *Bythites fuscus*) post-anal appendages have been described, and as a converse inquiry we may ask whether these two species may not be viviparous.

The inflated condition of the abdomen in *Saccogaster maculata* is doubtless directly related to the viviparous process; but it is interesting to note that this character is nearly as well marked in the adult male as in the adult female.

Again, the peculiar arrangement of the scales, which are scattered and non-imbricating, is probably one of the implications of intra-



Saccogaster maculata.

abdominal gestation; for it would facilitate the increasing distension of the abdomen which must follow the growth and enlargement of the embryos. And it is worthy of note that this character also is as conspicuous in the male as it is in the female.

The drawing represents the male of *Saccogaster maculata*, natural size.

These notes are, I am well aware, very incomplete. We require to know something of the histological appearances of the ovarian wall—whether or not it is furnished with glands or other structures which might supply nutriment to the developing embryo, through the yolk-sac or otherwise. We require to know more of the details of structure of the embryo—whether or not it possesses any organs for absorbing nutriment beyond that supplied by the yolk. But the scanty material available is not in a fit state for histological manipulation; and as the capture of a pregnant female of a particular species of deep-sea fish is not an event to be calculated upon with any certainty, I venture to present these rough notes on an interesting subject just as they are.